

Remarks/Arguments:

This invention is directed to a plasma display device with specific green phosphors. Claims 1-2, 5-6, 8, and 11 have been rejected as anticipated by US 2002/0041145 ("Yokosawa") under 35 U.S.C. § 102. Claims 5-6 and 8 have been cancelled, rendering their rejections moot. It is respectfully submitted that claims 1 and 2 are patentable over the art of record for the reasons set forth below.

Yokosawa discloses a green light emitting phosphor with the general formula $L_{1-x}Tb_xAl_3(BO_3)_4$ where L denotes at least one element selected from Y and Gd, and x is a number satisfying $0.1 < x \leq 0.7$. (Yokosawa at [0016]-[0017].) Yokosawa also discloses that the green light emitting phosphor may have the general formula $L_{1-x-y}Tb_xCe_yA_3(BO_3)_4$ [sic $L_{1-x-y}Tb_xCe_yAl_3(BO_3)_4$]¹ where L denotes at least one element selected from Y and Gd, and x and y are numbers satisfying $0.1 < x \leq 0.7$, and $0.00001 \leq y \leq 0.01$. (Yokosawa at [0018]-[0019].)

Applicants' invention, as recited by claim 1, includes a feature which is neither disclosed nor suggested by the art of record, namely:

. . . the green color phosphor comprising at least one kind selected from among phosphor materials defined by any one of the formulas selected from

formula $M_{1-a}(Ga_{1-x}Al_x)_2O_4:Mn_a$ (where "M" denotes one of Ca and Sr, $0.01 \leq a \leq 0.06$, and $0.1 \leq x \leq 1.0$),

formula $(Y_{1-a-y}Gd_a)(Ga_{1-x}Al_x)_3(BO_3)_4:Tb_y$ (where $0 \leq a \leq 1$, $0.1 \leq x \leq 1.0$, $0.02 \leq y \leq 0.1$, $0.08 \leq 1-a-y \leq 0.98$),

formula $(Y_{1-a-y}Gd_a)(Ga_{1-x}Al_x)_3(BO_3)_4:Ce_y, Tb_y$ (where $0 \leq a \leq 1$, $0.1 \leq x \leq 1.0$, $0.02 \leq y \leq 0.1$, $0.08 \leq 1-a-y \leq 0.98$),

formula $(Y_{1-a-y}Gd_a)BO_3:Tb_y$ (where $0 \leq a \leq 1$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$), and

formula $(Y_{1-a-y}Gd_a)_3(Ga_{1-x}Al_x)_5O_{12}:Tb_y$ (where $0 \leq a \leq 1$, $0.1 \leq x \leq 1.0$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$).

¹ Although paragraph [0018] states that the formula is $L_{1-x-6}Tb_xCe_yA_3(BO_3)_4$, we presume the inventor intended to disclose Al_3 , not A_3 , and will respond to the rejection according to this presumption.

The formulas specify the composition of different phosphor materials disclosed in the instant application. These formulas are found in the originally filed application at page 5, lines 16-21 and page 13, lines 3-12, and page 26, lines 2-3 as amended on page 9 of the preliminary amendment of May 9, 2005 filed concurrently with the originally filed application. No new matter has been added. Comparing the phosphors disclosed in Yokosawa to the above-claimed phosphors demonstrates that the claimed phosphors use different elements in different amounts. Thus, Yokosawa does not disclose the instant phosphors.

It is because Applicants include the specific phosphor materials that the advantages of adsorbing only limited amounts of water, carbon monoxide, carbon dioxide and hydrocarbon, and so preventing consequent chemical reactions with these compounds, is achieved. Accordingly, for the reasons set forth above, claim 1 is patentable over the art of record.

Claims 2 and 11, while not identical to claim 1, includes features similar to claim 1. Accordingly, claims 2 and 11 are also patentable over the art for the reasons set forth above.

Claims 3, 7, and 9 have been rejected as anticipated by US 2002/0113542 ("Bechtel") under 35 U.S.C. § 102. Claim 9 has been cancelled, rendering its rejection moot. It is respectfully submitted that claims 3 and 7 are patentable over the art of record for the reasons set forth below.

Bechtel discloses green-emitting phosphors of the formulas $\text{Zn}_2\text{SiO}_4:\text{Mn}$, $\text{BaAl}_{12}\text{O}_{19}:\text{Mn}$, $\text{Y}_2\text{SiO}_5:\text{Tb}$, $\text{CeMgAl}_{11}\text{O}_{19}:\text{Tb}$, $(\text{Y}_{1-x}\text{Gd}_x)\text{BO}_3:\text{Tb}$ with $0 \leq x \leq 1$, $\text{InBO}_3:\text{Tb}$, $\text{GdMgB}_5\text{O}_{10}:\text{Ce,Tb}$, and $\text{LaPO}_4:\text{Ce,Tb}$. (Bechtel at [0041].)

Applicants' invention, as recited by claim 3, includes a feature which is neither disclosed nor suggested by the art of record, namely:

. . . the green color phosphor being a mixed phosphor comprising:

a phosphor of formula $\text{M}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ (where "M" denotes one of Ca and Sr, $0.01 \leq a \leq 0.06$, and $0.1 \leq x \leq 1.0$) and

a phosphor of formula $(\text{Y}_{1-a-y}\text{Gd}_a)\text{BO}_3:\text{Tb}_y$ (where $0 \leq a \leq 1$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$).

The formulas specify the composition of the different phosphor materials claimed in the instant application. These formulas are found in the originally filed application at page 5, lines 16-21,

page 13, lines 3-12, and page 26, lines 2-3 as amended on page 9 of the preliminary amendment of May 9, 2005 filed concurrently with the originally filed application. No new matter has been added. The claimed mixtures of phosphors are different from Bechtel because Bechtel does not disclose a phosphor of the general formula $M_{1-a}(Ga_{1-x}Al_x)_2O_4:Mn_a$ (where "M" denotes one of Ca and Sr, $0.01 \leq a \leq 0.06$, and $0.1 \leq x \leq 1.0$). Nor does Bechtel disclose the amount of terbium used in the phosphor of the general formula $(Y_{1-a-y}Gd_a)BO_3:Tb_y$ (where $0 \leq a \leq 1$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$), or the relationship between the concentrations of terbium to yttrium and gadolinium. Thus, Bechtel does not disclose the claimed phosphor mixtures.

It is because Applicants include the specific phosphor materials that the advantages of adsorbing only limited amounts of water, carbon monoxide, carbon dioxide and hydrocarbon, and so preventing consequent chemical reactions with these compounds, is achieved. Accordingly, for the reasons set forth above, claim 3 is patentable over the art of record.

Claim 7, while not identical to claim 3, includes features similar to claim 3. In addition, Bechtel does not disclose any of the other green phosphor mixtures claimed in claim 7. Accordingly, claim 7 is also patentable over the art for the reasons set forth above.

Claims 4 and 10 have been rejected as anticipated by JP 10-088126 ("Ueda") under 35 U.S.C. § 102. Claim 10 has been cancelled, rendering its rejection moot. It is respectfully submitted that claim 4 is patentable over the art of record for the reasons set forth below.

Ueda discloses materials with the empirical formula $(Zn_{1-x-y}Mg_xMn_y)O \cdot n(Ga_{1-z}aluminum_z)_2O_3$ where $0 \leq x \leq 1.0$, $1 \times 10^{-5} \leq y \leq 1 \times 10^{-1}$, $0 \leq z \leq 1.0$, and $0.95 \leq n \leq 1.05$. (Ueda at [0011], [0014].)

Applicants' invention, as recited by claim 4, includes a feature which is neither disclosed nor suggested by the art of record, namely:

. . . the green color phosphor being a mixed phosphor comprising:

a phosphor of formula $M_{1-a}(Ga_{1-x}Al_x)_2O_4:Mn_a$ (where "M" denotes one of Ca and Sr, $0.01 \leq a \leq 0.06$, and $0.1 \leq x \leq 1.0$) and

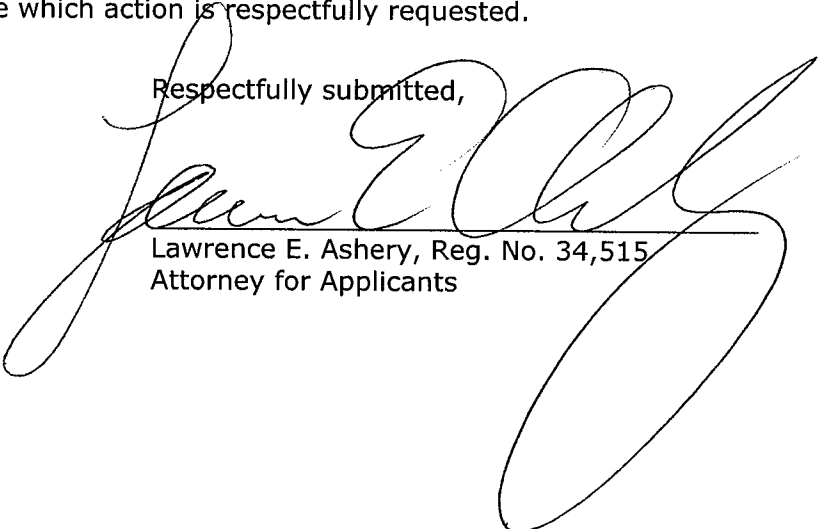
a phosphor of formula $(Y_{1-a-y}Gd_a)_3 (Ga_{1-x}Al_x)_5 O_{12}:Tb_y$ (where $0 \leq a \leq 1$, $0.1 \leq x \leq 1.0$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$).

The formulas specify the composition of the different phosphor materials claimed in the instant application. These formulas are found in the originally filed application at page 5, lines 16-21, page 13, lines 3-12, and page 26, lines 2-3 as amended on page 9 of the preliminary amendment of May 9, 2005 filed concurrently with the originally filed application. No new matter has been added. The claimed mixture of phosphors are different from Ueda because Ueda does not disclose a phosphor of the general formula $M_{1-a}(Ga_{1-x}Al_x)_2O_4:Mn_a$ (where "M" denotes one of Ca and Sr, $0.01 \leq a \leq 0.06$, and $0.1 \leq x \leq 1.0$). Nor does Ueda disclose the amount of terbium used in the phosphor of the general formula $(Y_{1-a-y}Gd_a)BO_3:Tb_y$ (where $0 \leq a \leq 1$, $0.02 \leq y \leq 0.4$, $0.08 \leq 1-a-y \leq 0.98$), or the relationship between the concentrations of terbium to yttrium and gadolinium. Thus, Ueda does not disclose the claimed phosphor mixtures.

It is because Applicants include the specific phosphor materials that the advantages of adsorbing only limited amounts of water, carbon monoxide, carbon dioxide and hydrocarbon, and so preventing consequent chemical reactions with these compounds, is achieved. Accordingly, for the reasons set forth above, claim 4 is patentable over the art of record.

In view the amendments and arguments set forth above, the above-referenced application is in condition for allowance which action is respectfully requested.

Respectfully submitted,


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